CLAIMS

What is claimed is:

1. An apparatus to determine a cracking angle of a selected test component, comprising:

a movable chuck operably movable relative to a fixed chuck in a selected path and according to a selected characteristic;

a bending module operable to move said movable chuck in the selected path;

a position sensor to sense the position of said movable chuck relative to said fixed chuck; and

a control module operably controlling said bending module;

wherein said control module is operable to select said selected characteristic.

2. The apparatus of claim 1, wherein said selected path allows said movable chuck to bend the selected test component relative to said fixed chuck in a plurality of angles.

3. The apparatus of claim 1, further comprising:

a force sensor to sense a selected force relative to at least one of said movable chuck and said fixed chuck.

4. The apparatus of claim 3, wherein said force includes at least one of a torque, pressure, tension, and combinations thereof.

5. The apparatus of claim 1, wherein said selected characteristic includes a bend speed;

wherein said control module selectively controls said movable chuck to move at a selected rate relative to said fixed chuck.

6. The apparatus of claim 1, wherein said selected characteristic includes pause times;

wherein said control module controls said movable chuck to pause at a selected position for a selected period of time.

7. The apparatus of claim 1, wherein said control module controls said bending module by providing a signal to said bending module to move said movable chuck relative to said fixed chuck.

8. The apparatus of claim 1, wherein said control module and said bending module are substantially integrally formed as a single component.

9. The apparatus of claim 1, further comprising:

a data storage apparatus operable to collect data from said position sensor as said control module controls said bending module.

10. The apparatus of claim 1, wherein said control module is operable to collect data from said position sensor to determine the position of said movable chuck relative to said fixed chuck at a selected time;

wherein said the sensed position of said movable chuck relative to said fixed chuck allows for a determination of an angle at which the test component is bent.

11. The apparatus of claim 1, wherein said control module is user programmable to control said bending module to sense a position of said movable chuck relative to said fixed chuck and determine a bend angle of the test component when a crack forms in the test component.

12. A system to determine the cracking angle of a selected test component to assist in determining embrittlement potential of a selected process, comprising:

a bending module operable to bend the selected test component; and

a control module operable to control said bending module to select a bending characteristic of the test component;

wherein at least one of said control module and said bending module are operable to determine an angle of bending at a selected time;

wherein at least one of said control module and said bending module are operable to determine when a crack occurs in the selected component.

13. The system of claim 12, wherein said bending module includes a first chuck and a second chuck wherein one of said first chuck and said second chuck is movable relative to the either of said first chuck and said second chuck.

14. The system of claim 13, wherein said control module controls the movement of at least one of said first chuck and said second chuck relative to said the other of first chuck and said second chuck.

15. The system of claim 13, wherein said first chuck and said second chuck are operable to engage the selected test component and bend the selected test component substantially according to a selected sequence provided from said control module.

16. The system of claim 12, wherein said bending characteristic includes a degree per minute, a step per increment, a delay, number of pauses.

17. The system of claim 16, wherein said a degree per minute includes the rate at which a first chuck moves relative to a second chuck;

wherein said bending module moves said second chuck per instructions from said control module.

18. The system of claim 12, wherein said maximum bend angle includes a maximum angle to which the selected test specimen is to be bent.

19. The system of claim 18, wherein said maximum bend angle is reached through a plurality of a combination of movements and pauses;

wherein the selected test specimen is bent to a selected position and held at the selected position for a selected period of time and repeated until said maximum range of motion is reached.

20. The system of claim 12, further comprising an angle sensor operable to determine the angle at which the selected test specimen is bent at a selected moment in time.

21. The system of claim 12, further comprising:

a force sensor operable to sense a force experienced by said bending module as the selected test specimen is bent by said bending module.

22. The system of claim 21, wherein said control module is able to determine the presence of the crack and the selected test specimen by the force sensed by said force sensor.

23. The system of claim 12, wherein said control module is operable to determine an angle at which the crack appears in the selected test specimen; and

a least one of store the determined angle in said control module and transmit said determined angle to a storage unit.

24. The system of claim 12, further comprising:

a moveable chuck to engage and bend the test specimen relative to a fixed chuck;

a position sensor to sense the position of the moveable chuck relative said fixed chuck at a selected time; and

a force sensor to sense a force experienced by said bending module at the selected time;

wherein said control module is operable to selectively record said position and said force at the selected time.

25. A method of determining an embrittlement potential, comprising:

providing a plurality of substantially similar components;

positioning a first specimen of said plurality of substantially similar specimens in an apparatus;

selectively bending said first component;

determining with said apparatus a first angle of said first specimen when a crack occurs;

processing a second component of said plurality of substantially similar specimens;

selectively bending said second specimen; and

determining with said apparatus a second angle of said second specimen when a crack occurs.

26. The method of claim 25, wherein processing includes heating, annealing, cleaning, applying chemicals, stressing, and combinations thereof.

27. The method of claim 25, wherein said apparatus includes:

a bending module for selectively bending at least one of said first specimen and said second specimen; and

a control module for controlling said bending of at least one of said first specimen and said second specimen.

28. The method of claim 27, further comprising:

sensing with a sensor an angle of said first specimen and said second specimen at a selected time.

29. The method of claim 28, further comprising:

sensing a force relative to the angle of said first specimen and said second specimen.

30. The method of claim 29, wherein determining with said apparatus at least one of said first angle of said first specimen when a crack occurs and determining with said apparatus said second angle of said second specimen when a crack occurs includes:

sensing a lessening of a force sensed by said sensor and recording an angle of said first specimen and said second specimen when said lessening of said force is sensed.

31. The method of claim 25, further comprising:

determining a difference between said first angle and said second angle.